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ECONOMIC EFFECT OF

TELEVISION-NETWORK PROGRAM "OWNERSHIP"

by

Robert W. Crandall

Number 50 3d copy February 1970

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Economic Effects of Network "Ownership" of Television Programs

Robert W. Crandall*

It does not require great perception to detect widespread dissatisfaction with the quality of network television programming in the United States. Criticism of program quality and diversity seems to increase with time, but the programs change very little. This is most discouraging in view of the fact that television is subject to social control; but, given the diversity of opinions and political pressures which bear upon the Federal Communications Commission, it is perhaps not surprising that the Commission is unable to pursue a clear, consistent policy which might improve television-industry performance.

Recent changes in policy and personnel at the F.C.C. give rise to some optimism that significant improvements in programming may yet be forthcoming. These changes may be delayed if the Commission is to continue to pursue a regulatory proposal advanced by its Office of Network Study four years ago.

In 1965, the F.C.C. published a Proposed Rule which would limit network prerogatives in licensing their prime-time entertainment programs.[1] This Rule lay dormant for three years, but 1968 found the Commission interested once more in considering its adoption.[2] Unfortunately, the Rule has been virtually

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* Assistant Professor of Economics, Massachusetts Institute of Technology. My initial interest in this subject developed while I was a consultant for the Antitrust Division of the United States Department of Justice. Data utilized in this study were supplied by the networks, and I am grateful to these companies for their cooperation. Of course, the opinions contained herein are solely my own and do not reflect the views or opinions of the network companies or the Department of Justice. Statistical computations were performed by Susan Shea.

1. U.S. Federal Communications Commission, Notice of Proposed Rule-Making, In the Matter of Amendment of Part 73 of the Commission's Rules and Regulations with Respect to Competition and Responsibility in Network Television Broadcasting, Docket 12782, 1965.

2. See "Playback on 50-50 Proposal," Variety, September 25, 1968.

ignored by students of public regulation, and its attributes have been debated only by those parties directly affected by it.

The Commission has drafted the Proposed Rule in order to improve program quality, but careful analysis of industry structure and performance leads to the conclusion that the Rule will have little effect upon quality or diversity of programming. Indeed, the Rule will have little effect upon any important parameter other than network profits, but continued study and consideration of this proposal is a serious drain upon the resources and energies of the Commission which might be devoted to more substantial issues in the regulation of television.

I.

The Source of the Problem: Network Activities

Network functions. Basically, a network is no more than a broker of local stations' time. The network company secures contracts with a number of geographically-dispersed stations for access to their frequencies, and in turn the network sells to advertisers time in which to convey programs and attached commercial messages over the entire 'network' of stations. The network company need not own stations, provide cable or microwave interconnection, nor produce programs. It merely must maintain a brokerage office to bring national advertisers, the buyers, into contact with dispersed licensed television stations, the sellers, for the purpose of utilizing the stations' broadcasting time.

Of course, the three major networks today do not resemble the simple model of a broker. Networks own television stations, produce programs, and buy other programs for resale to advertisers, but interconnection services are still purchased from A.T.&T.[3] I shall not be concerned with the reasons for network

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3. Even this function may be integrated into network activities if network managers are unable to persuade the F.C.C. or A.T.&T. to lower the fees for microwave circuits leased by the networks. As this paper is being written, the network companies are suggesting that they be given permission to establish their own domestic satellite system for interconnection of their affiliated stations.

ownership of stations, but it is probable that the sole limit to network integration of this sort is to be found in F.C.C. regulations, which limit ownership of stations by a single organization to five in the VHF band. The bargaining pressures of bilateral oligopoly would undoubtedly press the networks to expand their ownership of local stations in the absence of F.C.C. regulation.

My primary concern is with the networks' backward integration into program production and program brokerage. These functions are now under F.C.C. attack for a variety of reasons.

As licensees of five stations each, the three networks are subject to the requirement (contained in the Federal Communications Act) that they broadcast in the public interest.[4] This requires the transmission of programs such as national news, local news, documentaries, local features, and other generally nonremunerative programs. As a result, each network has found it necessary to develop its own news and public service programming facilities and staff. Presumably, these functions could be contracted out, but the networks undoubtedly feel that control is more easily maintained through their own organization. In addition, maintenance of their own facilities probably allows greater flexibility in adapting to unforeseen news events and in assuring fairness in covering various editorial points of view.

While it is not surprising to find networks producing their own news and public-service programming, similar integration into entertainment programming is more difficult to explain. There would seem to be little reason for networks to produce their own westerns or situation comedies for continuing series or to produce motion pictures. Show business would seem to be somewhat

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4. Networks, as such, do not have statutory responsibility for broadcast matter. See Television Network Program Procurement, Second Interim Report by the Office of Network Study (U.S. Federal Communications Commission, 1965), p. 200. (Hereafter this volume will be referred to as the Second Interim Report.)

alien to a broker of station time, but a glance at the history of the industry will show that networks have always produced some of their own entertainment programs although the past ten years have witnessed a striking decline in network-produced shows. As a substitute for their own productions, networks have turned to outside producers, but in so doing the networks have undertaken a new function -- the brokerage of programs.

Program sources. The three basic sources of network entertainment programming are (1) advertisers, (2) independent producers or "packagers," and (3) the networks' own production facilities.

1. Advertisers. Historically, an important source of prime-time series has been the advertiser. An advertiser may arrange to procure his own program series from an independent production company and bring this series to a network for exhibition. In such "advertiser-supplied" series, the advertiser merely pays the network a time rate for access to its interconnected stations, and the network does not intercede in program production details.[5] In practice, an advertiser will usually seek prior network approval before investing heavily in a new series since network exhibition is by no means assured for every series which an advertiser may wish to purchase.

An important aspect of this source of programming is the absence of network financial participation in the initial development of the series or in subsequent exploitation of episodes which are shown on the network. The advertiser and the producing company share in the risks and the financial rewards from such series, and the network's only compensation is from sale of time for the exhibition of the series during its first run.

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5. Usually, the advertiser and network enter into a one-year contract for the exhibition of such a series. This "first-run" agreement does not constitute "network ownership" in the Commission's view, but apparently a five-year contract between supplying advertiser and the network would constitute network "ownership" of first-run rights.

2. Independent producers. Instead of relying upon advertisers to arrange for their own entertainment programming, networks have begun to contract directly with independent producers or "packagers."[6] The networks then sell commercial minutes in these "packager-licensed" programs, varying the charge with the expected audience for the programs. Advertisers may purchase one or more commercial minutes in each of a large number of such packager-licensed shows as an alternative to supplying their own programs to the network.[7]

The network's role in packager-licensed programs is significantly different from that in advertiser-supplied shows. Usually, the network supplies at least part of the risk capital in developing the program format, producing the pilot, and producing the first few episodes. In addition, the network usually obtains the right to exhibit the program series over its facilities for at least five years while the usual agreement between advertiser and network for advertiser-supplied programs is only one year. Finally, the network and packager negotiate for shares in all ancillary revenues which may emerge from a successful series. Thus, a network exposes itself to considerable risk in procuring its programs directly from independent packagers, but in return it may reap very large returns from network exhibition and ancillary rights of the successful series.

3. Network production. Each network is capable of producing entertainment programming of its own although such activity has been diminishing in recent years. Obviously, in network-produced programs, the network underwrites the entire risk and reaps all of the consequent gains (or suffers all of the losses)

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6. "Packagers" are program-supplying companies. In the industry parlance, "producers" are creative agents employed by packagers.

7. The number of commercial minutes per hour of prime-time programming is not controlled by the F.C.C., but an industry tradition limits the number to six for all prime-time programs except motion pictures, in which there are seven. Advertisers may purchase all of the commercial minutes in any series if they choose, but this form of complete sponsorship of an individual series is declining as advertisers spread their messages among a larger number of series.

from the successful (or unsuccessful) shows. As in packager-licensed programs, time is sold to advertisers in these shows by commercial minute, and the price is a function of the expected number of viewers.

Since 1957, the advertiser-supplied program has been declining in relative importance and has almost disappeared as networks have turned to licensing their shows directly from independent packagers. In 1957, advertisers supplied 36.1 per cent of all prime-time hours of network entertainment programming. Networks produced 23.9 per cent of their own entertainment hours, licensed 39.3 per cent directly from packagers, and secured another 0.7 per cent in a combination of these ways. By 1968, the advertiser-supplied show had declined to only 3.4 per cent of prime-time entertainment hours while packager-licensed programs had risen to a 91.2 per cent share. Networks' own production of these programs declined to only 4.8 per cent of prime-time hours; the remaining 0.6 per cent are obtained by combination of these means.[8]

Accompanying this trend toward direct licensing by the networks has been an expansion in their role in the financing, development, brokerage, and subsequent exploitation of programs in all markets. It is this expanded role which alarms the F.C.C. and which requires further analysis.

Program brokerage. Central to the issue posed by the Federal Communications Commission is the networks' program-brokerage function. It is this act of intermediation which the Commission sees as severely constraining program packagers and reducing program quality.

Actually, the network is both a broker and dealer of entertainment programs. It contracts with packagers for nearly all of its prime-time entertainment series and resells time in these programs to advertisers. While it need

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8. These data may be found in Television Program Production, Procurement, Distribution, and Scheduling, A. D. Little, 1969. (Hereafter, referred to as the Little Report [1969]), p. 5. Prime time is defined as the hours between 6:00 p.m. and 11:00 p.m., Eastern Time.

not make a financial commitment in programs before advertisers indicate their preferences, the network finds it convenient to do so in order to assemble its season's programs far in advance of their first appearance on the air. Therefore, the network is more than a mere broker of programs for it provides investment capital for program development and commits itself to procurement of programs in advance of sales to advertisers.

The brokerage function of a network has developed slowly over the past decade. In previous years, networks sold time in programs to advertisers on a weekly or alternate-week basis for those programs which it produced or procured from outside suppliers. Advertisers might also bring programs to the networks through their advertising agencies, but networks generally dissuaded advertisers from sharing advertising time with more than one other advertiser in any series. In 1957, only 14 per cent of all prime-time entertainment series were sponsored by more than two advertisers.[9]

Beginning in the early 1960s, networks began to sell advertising time in series on a "participating" basis, allowing an advertiser to purchase a few one-minute commercial announcements in programs rather than a full season's commitment to a given program. This development proceeded hand in hand with the continuing trend toward packager-licensed programs, for networks could more easily develop such flexibility in sale to sponsors by first obtaining their programming from suppliers. By 1967, networks were selling commercial minutes to three or more sponsors in series accounting for over 90 per cent of their prime-time hours.[10] In fact, series sponsored by twenty-five or more separate advertisers occupied more than half of the prime-time entertainment hours on the networks in 1967.[11]

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9. Little Report (1969), p. 21.

10. Ibid., p. 17.

11. Ibid. Whether this change derived from advertisers' wishes or was instigated unilaterally by the networks is difficult to determine and irrelevant to the analysis which follows.

Program syndication. All network programs which are recorded on film or videotape have extra-network revenue potential from resales to independent domestic television stations and foreign television networks or stations. Sales of these "reruns" of network programs are referred to as "syndication" sales. In addition, the successful program may be exploited by attaching some of its copyrighted features to merchandise. Licensing of copyrighted features of these programs in such a fashion gives rise to "merchandising" revenues in the parlance of the industry.

Since networks now obtain nearly all of their entertainment programs directly from independent packagers, they may negotiate ex ante for a share of the revenues from any of the above sources. In practice, merchandising revenues are not very important, amounting to less than 5 per cent of the net revenues from syndication to the networks in 1967. Therefore, I shall ignore this rather heterogeneous merchandising market in the discussion which follows.

Networks and packagers may obtain income from syndicating network programs in two ways. First, either the networks or the producers may perform the actual distribution and promotion of the syndicated series for a percentage of the gross revenues. These syndication fees vary with the size of the transaction involved and are often different for domestic and for foreign sales; but, as with most other parameters involved, the fees are agreed upon by packager and network before the program is ever shown on the network.

As the networks have obtained less of their programming from advertisers, they have had greater opportunity to bargain for the rights to engage in the syndication of programs. But the percentage of total network entertainment hours in which networks have the rights to future syndication has not risen. In 1957, networks had these rights in 30.2 per cent of the entertainment hours currently in network exhibition. This share rose to a high of 35.0 per cent in 1964, but

it subsequently declined to 25.9 per cent in 1968.[12] In practice, the networks claim that they usually forego these rights if the packager has his own syndication organization although some exceptions to this practice do exist.

A second source of revenue from syndication derives from "profit shares" in the programs. These profit shares are obtained from the net revenues from syndication which are merely gross revenues less syndication fees, production "overages," and other costs. Overages are reimbursements to packagers for (unexpected) expenses incurred in production of the original episodes. Besides the networks and the packagers, participants in profits from syndication may include actors, directors, producers, or other creative personnel. In addition, fees for members of theatrical guilds must be deducted before the network and packager are able to claim their shares.

The percentage of all entertainment series currently being exhibited on network television in which networks have a share of syndication profits has risen substantially since 1957. In that year, networks had a profit share from domestic syndication in 36.5 per cent of prime-time hours and from foreign syndication in 37.2 per cent of prime-time entertainment hours. By 1966, these shares had risen to 67.8 for both markets, and they stood at 58.1 and 59.5, respectively, in 1968. Of those shows licensed directly to the networks by packagers, the networks obtained profit shares in nearly 60 per cent in 1968.[13]

According to network data reproduced in the Little Report, the three networks' net gain from syndication rights rose from $893,000 in 1960 to $3,509,000 in 1967 while net gain from syndication profit shares rose from $1,054,000 to $4,282,000.[14] These "net gains" reflect gross revenues less all costs incurred, including an unspecified allocation of joint administrative costs.

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12. Little Report (1969), p. 46. These data may also be obtained from the F.C.C.'s Office of Network Study.

13. Little Report (1969), pp. 48 and 54.

14. Ibid., pp. 64-65.

III.

The F.C.C.'s Complaint

In its Proposed Rule and the background studies which preceded it, the F.C.C. has taken a dim view of the above developments. It sees them as inimical to competition in program supply, syndication, and network broadcasting. Specifically, the Commission argues that:

a) The vitality of competition in program supply has been reduced by the concentration of buyers of programming occasioned by the networks' shift to direct licensing of their prime-time series.

b) Competition has also been reduced in syndication markets as the networks now have "ownership" interests in all but four per cent of network entertainment program hours.

c) The movement to packager-licensed programming has increased network control over programs.

d) Networks have used their monopsony power in licensing programs to obtain a financial interest in these programs, refusing to grant network exhibition for those programs in which the packager insists upon all syndication and merchandising rights and profit shares.

The Commission states in the concluding section of the Notice of Proposed Rule-Making that:

> "We proposed to encourage and increase competitive forces-- both creative and economic -- in television production and procurement through limitations on the capacity of network corporations to confine network schedules to programs in which they have financial and proprietary interests and through divorcement of networks from domestic syndication and, to some extent, foreign distribution."[15]

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15. U.S. Federal Communications Commission, op. cit., p. 18.

The Commission's Proposed Rule stipulates that:[16]

i. Networks be forbidden to obtain syndication rights or profit shares in any program not produced by them.

ii. Networks be forbidden from distributing programs which they produce to domestic syndication markets or to retain profit shares from domestic syndication. They would be forced to sell their rights to domestic syndication to another entity, but they would be permitted to distribute their own programs in foreign markets.

iii. During prime time, networks be required to obtain at least 50 per cent of their entertainment program hours from sources other than their own production facilities or direct licensing from packagers. (In terms of the discussion in Section I, above, this would require that at least 50 per cent of programs be advertiser-supplied or be placed through some other broker.)

In short, the network's program brokerage function is to be contracted by approximately fifty per cent for entertainment programs, and it is to be forbidden from all participation in domestic syndication revenues and nearly all access to foreign syndication markets. In this way, program diversity is to be increased, the supply of programs in syndication is to be expanded, and the number of U.H.F. stations will increase as the amount of programming available to them in syndication markets expands. As a result, the likelihood of a fourth network is enhanced because of the increase in U.H.F. outlets in markets now served by three or less stations.

The remaining sections of this paper will be devoted to a thorough examination of the F.C.C.'s charge and the resulting provisions in the Proposed Rule. Before proceeding, however, a brief digression on the source of network power is required.

III.

Concentration in Network Television - The Outcome of F.C.C. Regulation

One of the widely accepted notions in economics is that markets in which there exists "natural monopoly" require regulation by an outside authority in

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16. The text of the Proposed Rule may be found in the Notice, Appendix A, or in A. D. Little, Television Program Production, Procurement, and Syndication, 1966, Vol. I, Appendix A.

order to assure that prices are reasonably close to (socially-necessary) incremental costs. Communications markets have come to be regulated for quite another reason, however: the absence of property rights in the electromagnetic spectrum. In fact, it is regulation which has created monopoly power in one of the most important communications markets -- that of television broadcasting. Were it not for F.C.C. policy, there might be a larger number of competing national broadcasting companies.

It is the F.C.C. which allocates the electromagnetic spectrum among a variety of uses, including television. In its allocations plan which was adopted in 1952, the Commission sought to achieve maximum geographic dispersion of television stations despite complaints by the smallest of the four existing networks, Du Mont, that such a plan would force it to exit from network broadcasting.[17]

The allocation of frequencies by the F.C.C. was accomplished without an analysis of the current or prospective opportunity costs of spectrum space. Television has been granted most of the space between 54 megacycles and 210 megacycles in the V.H.F. band, and all of the space between 470 megacycles and 890 megacycles in the U.H.F. band. The Commission's delay in allocating the U.H.F. band has caused television stations operating at these frequencies to suffer a competitive disadvantage since millions of receivers were constructed without U.H.F. capability.

Whether the Commission has erred in granting too little or too much spectrum space to television transmission cannot be answered in this paper since neither the Commission nor other students of communications have been able to estimate the incremental opportunity costs of the spectrum or of satisfactory substitutes for the spectrum. But the Commission has overtly limited the use of substitutes in television broadcasting by impeding the development of pay

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17. Complete details of the allocation plan may be found in F.C.C., "Sixth Report on Television Frequency Allocations," 1952.

television and community antenna systems (CATV).[18] In short, the F.C.C. has until this time limited competition in television broadcasting by establishing a limit on the number of conduits through which television signals may be distributed.

It is the geographical distribution of television stations in the V.H.F. band which is most important in explaining current market structure in network television. Due to problems of adjacent channel interference, the maximum feasible number of V.H.F. stations in any single location is seven (Channels 2, 4, 5, 7, 9, 11, and 13), but every location cannot have seven stations due to cochannel interference. Given the distribution of population in the United States, a maximum allocation of, say, seven stations to New York and seven to Boston would make it difficult to provide many V.H.F. stations to Albany, Philadelphia, Hartford, Providence, Springfield (Mass.), and Manchester (N.H.). Reduction in the power allowed to the New York and Boston stations might alleviate this problem, but then there would be large gaps in reception between the cities, or much higher antenna costs imposed upon viewers in these areas.

In basing its allocation plan upon the seemingly equitable idea that each community should have a station wherever possible, the Commission granted very large cities between three and seven outlets, but where conflicts existed, it chose to allow smaller communities at least one station and to reduce the number of outlets in the large cities. Thus, Toledo (Ohio), Hartford-New Haven, Dayton (Ohio), Lansing (Michigan), and Charlotte (N.C.), for instance, each have but two V.H.F. outlets although each market is among the largest thirty in the nation. In only fourteen markets, comprising less than 40 per cent of the nation's television homes, are there four or more commercial V.H.F. stations.[19]

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18. The F.C.C. has just announced a change in its CATV policy, permitting and even requiring the origination of programming by Community Antenna systems. This is a welcome change which may lead to greater competition and diversity in television broadcasting.

19. Television Digest, Inc., Television Factbook, 1968.

In the largest 50 television markets, 76 per cent of television homes are able to receive a fourth signal from either U.H.F. or V.H.F. band, but in smaller markets, comprising nearly half of the nation's television homes, this percentage is much smaller.[20] In only twenty-two of the markets ranked from 50 through 230 on the basis of weekly circulation, is there a fourth television station in either U.H.F. or V.H.F.[21] In many of these markets, there are less than three stations. While some homes in these smaller markets may be able to receive an independent fourth station from nearby large television markets and others may do so through CATV systems, it would be surprising if more than 60 per cent of the nation's television homes were within reach of a fourth commercial station which is not a primary affiliate of one of three existing networks.[22]

It is this allocations policy which has limited the number of national networks to three, resulting in limited program diversity and quality.[23] That a fourth network cannot hope to compete with the three major firms currently in existence is quite clear when one examines the nature of competition in network broadcasting.[24]

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20. Little Report (1969), p. 151.

21. Television Digest, Television Factbook, 1968.

22. Overlapping markets will often find some homes capable of receiving more than three commercial stations, but most often these stations are not a source of variety in programming since they are affiliated with the same three networks. Given that most homes within the range of a given station in these markets cannot receive more than three signals, a fourth network will be unable to obtain outlets there.

23. The conclusion that fewness of broadcast services leads to lack of diversity in programming is quite generally accepted by students of the industry. See Peter Steiner, "Program Patterns and Preferences and the Workability of Competition in Radio Broadcasting," Quarterly Journal of Economics, May 1952, pp. 194-223; Jerome Rothenberg, "Consumer Sovereignty and the Economics of Television Programming," Studies in Public Communication, Number 4, Autumn 1962, pp. 45-54; John J. McGowan, "Competition, Regulation, and Performance in Television Broadcasting," Washington University Law Quarterly, 1967, No. 4, pp. 499-519.

24. A more rigorous examination of the nature of network competition and program diversity requires the use of mathematical exposition which is too intricate for the purposes of this paper. See Robert W. Crandall, "Television Network Competition and Program Diversity," unpublished manuscript, 1969.

Network managers cannot increase the number of prime-time hours of programming which they send to their interconnected affiliates once they have encountered the constraint of 28 hours per week. Competition can then only take the form of quality variations in programs. Specifically, a model of the profit-maximizing network tells us that each network will choose its programs for each hour of prime time in such a manner as to maximize the difference between the additional value of the program, measured in additional advertising revenues, and the cost of the program.[25] This incremental profit may be represented quite simply as:

$$MP = MR \cdot MA - p_p$$

where MP = incremental profit from a given hour of network broadcasting.

MA = the addition to the network's viewer hours for the programming period (in our case, a single week).

MR = incremental revenue per additional viewer hour.

p_p = the price of the program episode paid by the network to the packager.

But MA is itself a function of p_p -- the price of the program -- since a network may entice additional viewers to its program during a given hour by increasing its program expenditures. This may take the form of securing high-rent performers, using special video effects, procuring scripts from well-known writers, or utilizing other costly production techniques. For a given type of programming, a network is less likely to expend large sums on programs if it has a complete monopoly in television broadcasting since it can only increase its audience through attracting viewers who otherwise would not be watching television at all. If there are rival oligopolists, however, and if the incremental profitability of a given type of programming is high for a specific price of programming, it is likely that a network will seek to attract viewers from the others' programs

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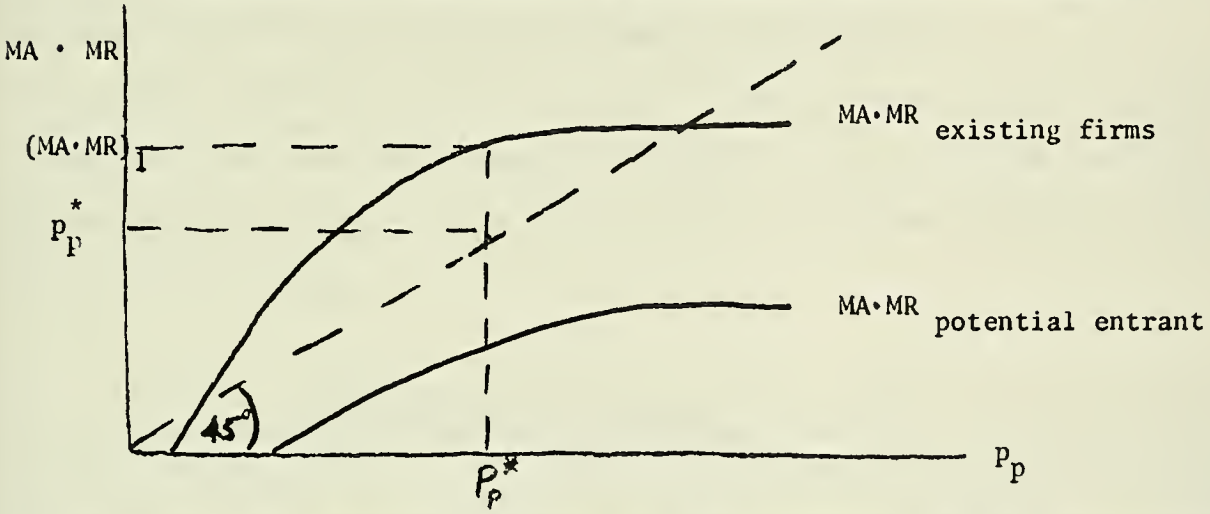
25. I ignore the costs of interconnection and affiliate compensation as well as other overhead costs in this discussion because they do not vary among different types of programs broadcast by the network. Unless the marginal profitability of the programs broadcast by a network are sufficient to cover these fixed costs, the network will not broadcast a full 28 hours per week. At present, this possibility looms only for A.B.C., the least profitable of the three networks.

by adding to its program expense. This procedure will continue until each network feels that adding to the cost of the given program will not result in an equivalent increase in its marginal value product (MR•MA).[26]

The disadvantage faced by an entrant which cannot attract a roster of affiliates capable of reaching a very large percentage of the nation's television homes may be depicted in Figure 1. The smaller the entrant's number of affiliates, the smaller will be his potential audience for any given hour of programming (MA). Given an array of possible program expenditures upon a par-

Figure 1

Profitability of One Hour of a Given Type of Network Programming



ticular type of programming,[27] the entrant's MR•MA curve will be correspondingly lower than that of his existing rivals. If these established networks choose programs of price p_p^*, they will receive a gross margin of $(MR \cdot MA)_1 - p_p^*$ from which to defray their costs of interconnection, affiliate compensation, and overhead expense. The entrant may not be able to cover his program costs, much less other fixed costs, from this type of programming if he can reach but 60 or 70 per cent

26. The final equilibrium depends upon the behavioral assumptions underlying the oligopoly model. It is conceivable that networks might arrive at the joint-profit maximizing program structure subject to the constraint of no side payments, but this outcome is extremely unlikely due to the difficulty of policing program decisions and responding to rivals' successful decisions rapidly.

27. At any time a network may choose from a number of different program "types," but whatever the entrant's choice, its incremental revenue will be less than that of its rivals from similar programs. The discussion above is limited to a single type of program as a matter of graphical and expositional convenience.

of the nation's television homes. Unless rivalry among networks is so limited as to result in very large gross profit margins, it is unlikely that a fourth network could survive. While data on prices and costs of entertainment series are scarce, it is doubtful that the outcome of current network rivalry allows profit margins on prime-time series of more than 10 to 15 per cent after the deduction of all fixed costs.[28] A fourth network would probably reduce this margin for existing networks, and it would hardly be able to compete with these networks without a complement of affiliates capable of reaching, say, 85 to 90 per cent of the nation's television homes. Since such circulation is impossible given the F.C.C. allocations plan, a fourth network cannot hope to compete with the three major firms by offering programs of similar type.

Might there be programs which a small network could exhibit at a profit -- programs which existing networks shun simply because more expensive, mass-appeal programming leads to larger net profits? This seems exceedingly doubtful for a number of reasons.

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28. F.C.C. Broadcast Financial Data show a rather constant 8.5 per cent net profit margin before taxes for the networks in 1964-66, but there is no way of assessing the validity of such data given the necessity of intra-firm divisions of costs and revenues among owned stations and network operations. It is undoubtedly true that the net profit margins on entertainment programming are much higher since networks presumably obtain very low (perhaps even negative) profit margins from news and public-service broadcasting. Given new program costs of $160,000 per hour in 1967 and median revenues of $210,000 per prime time entertainment hour in the fall of 1967, it is possible that network profit margins were no more than 10 per cent in even the most profitable of hours. Since approximately two-thirds of all prime-time programs are held over from the previous seasons, the average program costs to networks may be estimated at $140,000 per hour in 1967 in the absence of escalation clauses. A maximum estimate of gross margins for fall programs would therefore be $210,000 minus $140,000, or $70,000, from which affiliation payments and interconnection costs must be paid. These costs may be estimated at $45,000 - $50,000 per prime-time hour for 1967, leaving $20,000 - $25,000 in residual "profits" from which administrative costs must be deducted. The resulting net profit margin is clearly less than 15 per cent and may even be less than 10 per cent, but the calculations are only approximate. For instance, there are no data on the price of repeat episodes for these programs which are shown in spring and summer. These repeat episodes bring smaller audiences and therefore lower gross revenues -- a median value of $190,000 per hour in April, 1968, and $130,000 per hour in July, 1968 (Little Report[1969], p. 45) -- but repeat episodes may be much less costly to networks than the first run of these episodes. Therefore, it

First, it is difficult to imagine a program which would allow a fourth network to cover its fixed costs of interconnection, which may be as high as $100,000 per week, and its affiliation costs, but which would not be enormously profitable to a network which has the capacity to reach a much larger home audience. Secondly, the types of programs which might fit into such a category are likely to be "talk" shows or films of old sports events, documentary films, or the like, which are available now in syndication markets.[29] The formation of a network to simulcast such fare seems most unlikely. Finally, recent attempts to produce inexpensive dramas of the "soap opera" variety for original use on independent stations throughout the country have not met with great success despite a market which potentially encompasses all of the stations which a fourth network could attract.[30]

The notion that the paucity of affiliates is the limiting factor in network broadcasting is amply borne out by a number of independent observations. From 1948 through 1955, the DuMont network competed with its larger rivals, but it was forced to exit when the F.C.C. allocations plan made it impossible for DuMont to gain access to sufficient affiliates.[31]

At the present time, it is widely acknowledged that A.B.C. is the least profitable of the three major networks, and A.B.C. has even claimed that

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would be difficult to measure precisely the magnitude of net profit margins in prime-time entertainment programming. the reader should note that 10-15 per cent net margins may reflect extremely high profit rates (as a percentage of capital invested) in this industry given the relatively high sales/capital ratio.

29. The Little Report (1969), p. 79, estimates that "talk" and "talk-variety" programs account for over 50 per cent of all program hours produced specifically for nonnetwork exhibition (the"first-run syndication" market). Adventure, mystery, and comedy shows account for only 10 per cent of such programming, reflecting the difficulty of filming these programs for only the nonnetwork market.

30. See Variety, September 24, 1969, p. 39, for a description of the difficulties encountered by producers of this type of programming.

31. Se the testimony of A.B. DuMont in Hearings, Subcommittee on Communications, Senate Interstate and Foreign Commerce Committee, 83rd Congress, 2nd Session, 1954, for a discussion of the problems which faced the DuMont network.

its network television activities are undertaken at a loss.[32] A large part of this difference in performance between A.B.C. and its rivals can be explained by its roster of affiliated stations. In those markets in which there are three or more affiliates, A.B.C. typically has the least attractive outlet. The gross network time rate charged by a network for each station for advertiser-supplied programs and from which the network calculates its affiliate compensation may be taken as a rough measure of the potential audience capability of the station. In the three-or-more station markets, A.B.C.'s affiliates' gross network time rates are nearly 12 per cent below those of N.B.C. affiliates and 9 per cent below those of C.B.S. affiliates.[33] A similar disadvantage undoubtedly carries over into one- and two-station markets in which A.B.C. is less likely to obtain clearance for its programs than are C.B.S. and N.B.C.

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32. In its decision on the proposed merger between A.B.C. and I.T.&T. in 1967, the Federal Communications Commission accepted the argument that A.B.C.'s network television operations were operating at a loss during the 1963-1966 period. This loss increased from $4.6 million in 1963 to $9.0 million in 1966, while the combined before-tax profits of C.B.S. and N.B.C. network activities were rising from $61.0 million to $87.7 million. Of course, these data reflect cost and revenue allocations between network activities and owned-and-operated station operations. A.B.C. profits from their owned-and-operated television stations were more than sufficient to offset A.B.C. network losses in each year. (See P&F Radio Regulation Reports, 10 RR 2d 289 ff., June 22, 1967.)

33. The sum of the gross hourly rates for 101 three-station markets, based upon the latest rate cards available for publication in the 1968 Television Factbook, is $108,425 for A.B.C., $119,000 for C.B.S., and $123,390 for N.B.C. It is reasonable to assume that differences in rates among stations in the same market reflect differences in audience potential due to assigned frequency differences, differences in maximum broadcast wattage allowed by the F.C.C., or variance in station management.

It is interesting to note that A.B.C.'s gross revenues from its television network were $161 million in 1961 while C.B.S. and N.B.C. realized an average of $182.8 million in the same year. Thus, A.B.C. obtained nearly 12 per cent less gross revenue from networking than its larger rivals -- a magnitude almost identical to its affiliation disadvantage in the three-station markets. The F.C.C. is not unaware of this problem, and it once considered increasing the number of V.H.F. allocations in some cities to alleviate it. But after considerable deliberation, this idea was dropped in January 1960. (See F&P Radio Regulation Reports, loc. cit.)

A recent entry attempt by the United Television Network is further evidence of the importance of outlets which are capable of reaching all television homes. In May, 1967, United began broadcasting nationally by exhibiting one program per day at 11:30 P.M. - 1:30 A.M.[34] This decision was made because at that time period C.B.S. had no network service and C.B.S. affiliates could be attracted by United. Despite a roster of 106 affiliates, United suspended operations after only one month of broadcasting. It simply could not cover fixed costs[35] of network operation from the revenues from only 10 hours of programming per week during a period in which total audiences are small. Why did it not expand its program schedule to prime-time hours? It could not attract the C.B.S. affiliates at those hours, and its management must have deduced that broadcasting at these hours could not be undertaken profitably with a small roster of stations.

Until sufficient broadcasting outlets are available to a potential entrant to allow it to reach a very large percentage of the nation's television homes, market power will continue to reside in the hands of the existing three networks. This market power will result in homogeneity of program fare as long as the three networks are free to seek maximum profits, but attempts by the F.C.C. to limit the profit potential of networks is not necessarily conducive to improved program quality or to greater diversity. The Commission's Proposed Rule must be examined carefully in this light, for the mere fact that it may lead to lower network profits is not a sufficient reason for supporting it.

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34. See "United Network Forced to Quit," Broadcasting, June 5, 1967, pp. 34-36, ff., for a description of the difficulties faced by United.

35. At the time United faced a minimum charge of approximately $100,000 per week for five eight-hour periods of microwave interconnections. Since this time, A.T.&T. has reduced the minimum daily requirement for leasing trunk lines, but it is now seeking a large increase in rental rates.

IV.

An Evaluation of the F.C.C. Proposed Rule

If it is the F.C.C.'s failure to provide sufficient outlets to most of the nation's television homes which explains network concentration, and if this concentration explains the lack of program diversity, why has the Commission chosen to attack the route by which programs reach the networks rather than examining means to increase the number of channels available to most viewers? Will the F.C.C.'s Proposed Rule have the effect of increasing program diversity and making the syndication markets more competitive? A careful examination of these questions is attempted in this section.

Program diversity on the networks. The Commission's argument that networks' direct licensing of programs reduces the variety and "quality" of entertainment programming derives largely from an illusion about the willingness of advertisers to commit resources to inefficient promotion and from a rather romantic and nostalgic view of times past. The Second Interim Report is laced with allusions to the U.S. Steel Hour, Studio One, Armstrong Circle Theater, and ALCOA Presents.[36] These programs have disappeared in part because the advertisers are no longer able to obtain network time for them, the Commission argues. Networks, driven by their desire to maximize profits, are unwilling to schedule such quality programs themselves. The inescapable conclusion, according to the Commission, is that diversity would be served by forcing networks to rely heavily upon advertiser-supplied programs once again.

Unfortunately, the Commission's logic is faulty in a very elementary way. If advertisers wish to subsidize "quality" programming through much higher costs per viewer reached, why have they not made this demand felt from among the net-

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36. Much of the Second Interim Report is devoted to summaries of the testimony obtained from advertisers, producers, directors, and actors. Not surprisingly, many of these individuals placed the responsibility for the decline in "quality" programming upon the networks. (Chapters X through XII.)

works' packager-licensed programs? If these quality shows were remunerative to the networks, would they, in their quest for profits, forego them for mediocre westerns or situation comedies? For instance, why did A.B.C. fail to continue A.B.C. Stage '67, a program which the Commission must have found most appealing? The answer is to be found in advertisers' demand for the show which averaged but 5.6 million homes, or 20 per cent of those watching network television at the time, in the fall of 1966.[37] No large advertiser demonstrated its desire to support such a program by defraying the networks' opportunity cost, not U.S. Steel, Armstrong Cork Company, nor ALCOA. There are many similar examples which could be cited, and they lead to the inescapable conclusion that advertisers are unwilling to pay perhaps $6 or $7 per thousand homes per commercial minute for "quality" entertainment when more common shows are available at $3.50 to $4 per thousand.

But if the Commission is correct in its assertion that the number of truly fine dramatic shows has accompanied the decline in advertiser-supplied programs, how can such a trend be explained? The answer would appear to lie in the opportunity costs of the medium. It was not until 1953 that half of the nation's homes were equipped with a receiver.[38] At present more than 95 per cent have at least one set and another 30 per cent have at least two sets,[39] but the number of networks has remained at three. As a result, the value of network time has increased enormously, and this fact in combination with increasing production costs makes philanthropy a very costly policy for an advertiser on today's network television. In the early 1950s such firms as U.S. Steel, ALCOA,

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37. American Research Bureau, Network Television Target Audience, 1966 issues. Interestingly, the F.C.C. has acknowledged that this program, though of commendable quality, resulted in a net loss of $4 million to A.B.C. (P&F Radio Regulation Reports, 10 RR 2d 289 ff.)

38. Television Digest, Television Factbook, 1968.

39. Ibid.

and Reynolds Metals were among the nation's largest television advertisers, but they have reduced their network advertising in recent years,[40] perhaps realizing that nationwide network advertisements, purchased at a cost of $30,000 to $60,000 per minute, are not the most efficient means of promoting the sale of metal producers' goods.

There may be a germ of validity in the Commission's charge, however. While advertiser-supplied shows could not reach the networks without network scrutiny and approval, networks did not oversee every production when advertisers supplied programs. Producers, writers, and actors are understandably uneasy about the current trend, for networks are likely to participate more in creative details when purchasing programs directly. Since there are but three networks, this possibility of informal censorship is a serious matter.

But no one should be deluded into thinking that the networks would agree to exhibit an advertiser-licensed program which promised to attract significantly less than one-third of the total network audience during prime time. The mere exhibition of such a series would reduce the value of all succeeding shows on that network during the same evening because of the carryover effect of audiences in television. Once a viewer turns from a given network's program, it is difficult to rouse him back to that network for the rest of the evening. As a result, advertisers would not only have to contribute more resources per viewer in order to place a "quality" show on a network, but they would have to promise the network greater net revenue than it could obtain from a typical western or situation comedy in order to compensate it for later lost revenues. It is for this reason that networks usually offer their sacrifices to the F.C.C.'s appetite for public service programming during the last hour

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40. In 1968, these three firms spent only $8.3 million -- or less than the cost of the sponsorship of a single hour series for a season -- on all television. Network expenditures were $5.9 million. Only Reynolds, accounting for $6.4 million of the above total, shows an increase in television advertising in recent years. U.S. Steel has completely abandoned this medium, and ALCOA spent but $1.9 million in 1968. (Television Bureau of Advertising, 1968 Spot TV Expenditures and TVB News, February 24, 1969.)

of prime time.

Competition in program supply. Even more puzzling is the Commission's fear that program production is becoming concentrated as a result of networks' control of program brokerage. In its Notice, the Commission concludes:

> "...it is not desirable for so few entities (the networks) to have such a degree of power with respect to what the American public may see and hear over so many television stations. ...This intense concentration of power decreases the competitive opportunity for independent program producers..."[41]

At another point, the Commission cites the decline of new pilot films as a sign of decreasing competition in program supply due to the difficulty in dealing with network monopoly power.[42] The Commission fears that a decline in the number of producers will reduce syndication programming, the staple of independent new UHF stations. Given the networks' purchasing power and their insistence upon syndication rights and/or profit shares, independent producers' viability is threatened.

Without anticipating examination of the question of bargaining for syndication interest in network programs, it might be useful to examine market concentration in the program-supplying industry. According to the Little Report, the number of producers of television programs increased from 91 to 108 in the period 1958-67 but receded to 97 in 1968.[43] Producers of network programs have declined from 75 to 57 in that period.[44] Utilizing data derived from Broadcasting, I find that the number of suppliers of prime-time network entertainment programs declined from 54 to 49 from 1958 to 1967, but I would hardly interpret this reduction as an omen of declining competition.[45] Moreover, rarely does one supplier have as much as 10 per cent of the market in a given

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41. Notice of Proposed Rule-Making, p. 18. (Emphasis supplied.)
42. Ibid., p. 13.
43. Little Report (1969), p. 94.
44. Ibid.
45. It is impossible to detect joint ownership or control of program-supplying companies; therefore, I cannot assert that these data reflect the number of independent sources of prime-time programs. It should be noted, however, that the most important reason for the observed decline is the increasing average length of programs. There were fewer program series in 1967 than in 1958.

year, and these market shares are extremely volatile over time.

Such a simple measurement of producer activity can be quite misleading since the sources of programming for network and syndication markets are those which supply films for any of a variety of entertainment media. A production organization is merely a collection of various creative agents, and this organization need not have any sizable investment in tangible production capacity as that required for manufacturing firms. Companies may be organized for producing a single motion picture or television series in a few months and expire shortly after the completion of this single task. Production facilities can be leased from a wide variety of sources in any of a number of countries for the particular property to be filmed or taped. Creative inputs exist and thrive regardless of whether the network licenses its product directly or relies upon advertiser-supplied programs. The number of hours of programming produced for television is not so much a function of network decisions as of F.C.C. decisions regarding the number and distribution of licensed stations, CATV systems, and pay-TV outlets.

But even if the degree of competition among producers were a function of some parameter which the network can control, why should any network wish to concentrate its purchases among a few producers or to act in such a way as to drive others from the industry? Does the Commission seriously believe that the networks would create market power -- even if that were possible -- among the suppliers of their most important input?

Network participation in syndication revenues. Perhaps of greater importance in the F.C.C.'s complaint is the assertion that networks use their buying power to obtain rights and profit shares in program syndication. In the Second Interim Report, the Commission's Office of Network Study argues:

> "Despite th(e) assertions by network managers, it seems unlikely that their financial or proprietary interest in a program series may not, in many cases, be a determining factor in its choice for network exhibition...But, assuming normal commercial motives on the part of network managers, this in and of itself might dictate an interested choice by network managers between programs of apparently similar worth as schedule components. It would seem...that strong economic motives exist to impel the choice by network managers of those programs for exhibition in which they have acquired financial interests, the ultimate value of which may be determined or enhanced merely by such a choice."[46]

The Commission's Notice makes the same argument:

> "While it has been contended that this (financial) interest is not a substantial factor in program choice, it must be recognized that financial participation by network corporations in any proposed program may well be the decisive factor in its selection for network exhibition."[47]

The argument is a familiar one to students of industrial organization: firms with market power use their power, often through tying arrangements, to obtain power in an adjacent market. But the charge is even more extreme, for the network company not only insists upon "financial participation" in programs which it exhibits, but apparently succeeds in obtaining these interests at little or no cost. The Commission states that:

> "Direct sale to sponsors had economic advantages for independent producers. Sponsors only occasionally acquired or shared in syndication, foreign sales or other subsidiary rights. These rights usually were retained by independent producers and constituted valuable commercial assets which contributed to their economic stability and viability. The importance of the retention of these rights to the financial stability of independent producers is supported by the testimony of producers that in many, if not most, instances they do not recover their initial production costs from the network run of a program series but must look to syndication and foreign sales to 'make them whole' and to show a profit."[48]

Thus, the Commission is proposing to allow these producers to sell a large share of their output to advertisers who generally forswear syndication interests and rescue the suppliers from their impoverishment.

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46. Op. cit., p. 741.
47. Notice of Proposed Rule-Making, p. 18.
48. Ibid., p. 7.

The danger of network ownership of residual rights is thus seen to derive from two quite different phenomena:

1. Networks will gain control of an important source of supply of programs for struggling U.H.F. stations. Since the Commission is relying upon the proliferation of these U.H.F. outlets to provide the basis for the entry of new networks, it sees this control over the supply of syndicated programming as a threat to future network competition.[49]

2. The networks' insistence upon syndication interests is leading to the financial ruin of program suppliers -- the very backbone of program diversity. If networks are not prohibited from exerting their monopsony power in dealing with program suppliers, viewers will suffer a further reduction in quality programming as suppliers are forced to exit from the industry.

1. The control of syndication programs. This aspect of the Commission's charge requires serious consideration, for if networks are gaining monopoly power in syndication markets, it is possible that the number of U.H.F. stations able to operate profitably will decline. But once more the imprecision of the Commission's analysis leads it to unsupported conclusions.

As mentioned above, syndication interests take two forms -- distribution rights and profit shares. Networks claim that they do not obtain distribution rights in cases in which the program supplier has a distribution subsidiary, but exceptions do exist. Nevertheless, the three networks' degree of market control is hardly staggering. The three network companies have obtained distribution rights in only 28 per cent of their prime-time entertainment-series hours in the past ten years.[50] As a result, the networks have accounted for less than one-fourth of all syndication sales in this period. If the Commission believes

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49. Perhaps the recent change in F.C.C. policy toward cable television systems will change this emphasis. (See fn. 18, supra.)

50. Little Report (1969), p. 46.

that this degree of market concentration is likely to lead to a reduction in syndicated-program supply, it might consider acting to curtail network distribution activity, but this does not imply that network ownership of profit shares need also be reduced.

The ownership of profit shares entitles networks to share in the residual gain from program syndication. There is no evidence that this investment allows the networks or other participants to exert control over the distribution of these programs. Since the average network profit share is considerably less than 50 per cent for those series in which it has interests, it seems unlikely that such control could be exercised. Nonnetwork distributors exist in large numbers, and they are not likely to be dissuaded from competing simply because the networks are entitled to a share of residual profits.[51]

From all appearances, the syndication market appears to be quite competitive. In addition to the old network series, there are "first-run" syndication programs which are distributed by perhaps forty or fifty firms. At least twelve distributors -- including the network subsidiaries -- actively compete in the sales of old network series. As long as networks avoid accumulating the distribution rights in a large share of their prime-time programs, they will not gain market power in syndication. It is clear that they realize this and that their fear of antitrust action has led them to be cautious in this respect.

2. Program suppliers and network bargaining power. The Commission's notion that the networks exert monopsony power to a degree which imperils the financial stability of their suppliers is a curious one for several reasons. First, it seems contradictory to observe that the number of independently-produced television series is increasing at a time when networks are setting prices

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51. The Commission may well be acting against the interests of program suppliers if it refuses to allow networks to include profit shares in their portfolios of income-earning assets. This restriction might restrict the ability of small program suppliers to defray some of the risk of producing programs by selling future, risky returns for guaranteed present payments.

too low for suppliers to cover their costs. Second, it is unlikely that networks would wish to see the number of program suppliers decline, given the importance of maintaining an uninterrupted flow of programs for exhibition. Finally, it is not clear how monopsony power can be exerted without reducing the quantity of programs demanded, but such a reduction has not occurred.[52]

Elsewhere, I have argued that networks do not exert monopsony power in the manner charged by the Commission.[53] They do not force suppliers to cede them syndication interests; they simply buy them by paying higher costs per program. An econometric examination of differences in program prices provides evidence that the value of distribution rights plus a 100 per cent profit share is between 13 and 17 per cent of the total contract price for first-run episodes of a series on a network.

If networks pay suppliers for their syndication interests, what will be the effect of prohibiting such investments? Clearly, it will be to lower the prices paid by networks to producers for their programs. Will it lead to a change in network program decisions? The Commission charges that networks currently favor programs in which they (the networks) own syndication interests -- apparently on the mistaken notion that these interests are obtained at prices below their present value. Can such a "preference" be proven? The Commission only asserts the hypothesis; it does not attempt to substantiate it. It is possible to test this theory from evidence currently available to the Office of Network Study.

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52. The number of regularly-scheduled entertainment series hours in prime time has been increasing since 1958 -- rising from 69 and 1/4 hours to 74 hours in 1965, but dropping slightly to 73 and 1/2 in 1968. Some of these hours (approximately 20 per cent) are now given to exhibition of motion pictures, but these films are bought from a subset of the entire program-supplying industry. Moreover, some of these motion pictures are produced for initial exhibition on television, and other prime-time series are similar to motion pictures in length and artistic nature.

53. Robert W. Crandall, "The Supply Price of Programs to Television Networks and the Cost of Residual Rights," Bell Journal of Communications, forthcoming issue.

Each fall, the networks launch a new season of prime-time programs. Some of these programs are retained from previous years while others are new series. With the data on each program series which the networks submit to the F.C.C., it should be possible to discern if ownership of syndication interests affects the networks' retention decisions.[54] These data include:

X1 = average number of homes viewing the program during the year, expressed as a percentage of total television homes.

X2 = a dummy variable indicating network ownership of distribution rights. X2 = 1 if the network owns the foreign or domestic distribution right or both. X2 = 0 if the network owns neither distribution right.

X3 = the percentage of profits from syndication ("profit shares") which accrue to the network company.

Observations are available for all regularly-scheduled prime-time series scheduled for exhibition in the November Composite Week in 1960-65. I have divided the programs for each year into two categories: "retained" -- those programs which were continued into the next fall season; and "dropped" -- those programs dropped by the network before the next year's fall season. The purpose of the statistical analysis which follows is to detect the effect of X2 (distribution rights) and X3 (profit shares) upon program-series survival. If the Commission's hypothesis is valid, a program is more likely to appear in the "retained" category if X2 = 1 or if X3 is large than if X2 = 0 or X3 is small or zero.

The first statistical test utilized is simple analysis of variance in order to discover if an hypothesis of equal average values of X3 for retained and dropped series may be rejected. The test is performed upon each network's data for each year (18 comparisons) and for the three networks' pooled data for each year (6 comparisons). Only the latter results are reproduced in Table 1; the individual-network results appear in the Appendix.

54. These data were supplied to the author by the networks for the purpose of this study since information on program ownership is proprietary in nature and could not be released by the F.C.C. to outside persons.

Table 1

Program Retention Decision

All Networks

Year	Mean X1 Retained Series	Mean X1 Dropped Series	Difference	F Value	Mean X3 Retained Series	Mean X3 Dropped Series	Difference	F Value
1960	21.45	15.07	6.4	40.6**	22.67	26.96	-4.3	0.7
1961	21.35	15.43	5.9	45.1**	17.58	27.40	-9.8	4.4*
1962	21.49	14.37	7.1	37.1**	21.01	24.93	-3.9	0.5
1963	22.36	15.10	7.3	40.8**	19.82	25.12	-5.3	1.9
1964	21.35	15.50	5.8	61.9**	20.95	23.01	-2.1	0.2
1965	21.29	15.29	6.0	64.6**	25.28	25.09	0.2	0.0

* significant at 5 per cent level.

** significant at 1 per cent level.

As might be expected, the average audience size for retained series is significantly larger than that for series which were dropped the following season. The results for profit shares are quite different, reflecting little significant difference in average network ownership in the two classes of programs. In only one year (1961) is the network profit share difference significant at the five per cent level, and in this instance the average network profit share in the dropped series is larger.

The appropriate test for difference in distribution rights is the Chi-square test on the relative frequency of network ownership of domestic or foreign distribution rights (or both) in the retained versus the dropped series. These results appear in Table 2.

Table 2

Network Ownership of Distribution Rights and the Program Retention Decision

All Networks

Year	Proportion of Retained Series in Which Networks Owned Distribution Rights	Proportion of Dropped Series in Which Networks Owned Distribution Rights	χ^2
1960	0.154	0.423	4.52*
1961	0.212	0.257	0.19
1962	0.289	0.240	0.19
1963	0.316	0.231	0.55
1964	0.242	0.467	3.48
1965	0.324	0.270	0.26

*significant at 5 per cent level

Once more, the results do not confirm the Commission's hypothesis. In only one of six comparisons is it possible to reject the hypothesis that the relative frequency of network ownership of rights was equal for both categories, and in that year (1960) the proportion of programs in which the networks owned distribution rights was higher for dropped shows than for retained shows.

These results augur poorly for the hypothesis that network syndication interests affect network retention decisions for a program of given audience acceptance. In order to investigate this possibility, it is necessary to introduce all three variables into an analysis of covariance or to utilize discriminant analysis.

Our choice for this more sophisticated task is linear discriminant analysis. The object is to obtain from the data that function

$$Y = \ell_1 X1 + \ell_2 X2 + \ell_3 X3$$

which discriminates best between retained and dropped series. The X's have been defined above and the ℓ's are coefficients to be estimated from the inverse of the pooled dispersion matrix of the values of the X's. The measure of the discriminating power of each function is the Mahalanobis D^2 which is defined as the square of the difference between the mean value of Y for retained shows, and the mean value of Y for dropped shows:

$$D^2 = \left[\bar{Y}_r - \bar{Y}_d\right]^2 = \left[\ell_1(\bar{X}1_r - \bar{X}1_d) = \ell_2(\bar{X}2_r - \bar{X}2_d) + \ell_3(\bar{X}3_r - \bar{X}3_d)\right]^2$$

where the bars over the variable denote mean values and the subscripts r and d denote retained and dropped series, respectively. A test of the significance of each discriminant requires the construction of the following F statistic:

$$F_{k,n_r+n_d-k-1} = D^2 \cdot \left[\frac{n_r n_d (n_r+n_d-k-1)}{k\ (n_r+n_d)\ (n_r+n_d-2)}\right]$$

where n_r = number of observations in the sample of retained programs

n_d = number of observations in the sample of dropped programs

k = number of variables in the discriminant.

In order to measure the incremental contribution of X2 or X3, holding X1 constant, it is necessary first to estimate the discriminant which utilizes X1 only and then to add X2 and X3 separately and, finally, together. Table 3 contains the results for the pooled three-network sample for each of the six years 1960-65.

Once more, it appears that the network retention decision is not influenced greatly by the ownership of distribution rights or profit shares. In none of the six years does X3 add significantly to the discriminating power of the linear discriminant. Distribution rights, X2, contribute significantly to this discriminating power in three of six years -- two at the one per cent level and one at the five per cent level -- but in every instance the sign of the coefficient of X2 is negative, implying that the program is more likely to be dropped, ceteris paribus, if the network owns the distribution right.

Table 3

Linear Discriminant Analysis - Program Retention Decision

All Networks

Year	Discriminant No.	Variable	Coefficient	Mahalanobis D^2	F Value
1960	1	X1	0.4206	7.193	112.2**
	2	X1	0.4320	10.446	160.4**
		X2	-1.77 #		
	3	X1	0.4202	7.415	56.9**
		X3	-0.0102		
	4	X1	0.4316	10.552	53.1**
		X2	-1.740		
		X3	-0.006222		
1961	1	X1	0.553	10.730	167.4**
	2	X1	0.6065	13.402	112.1**
		X2	-1.5227 ##		
	3	X1	0.5429	11.545	96.6**
		X3	-0.01820		
	4	X1	0.5963	13.668	75.0**
		X2	-1.398##		
		X3	-0.01041		
1962	1	X1	0.3579	6.498	98.0**
	2	X1	0.3622	6.582	48.8**
		X2	-0.2904		
	3	X1	0.3588	6.560	48.6**
		X3	0.001444		

Table 3 (cont'd)

Year	Discriminant No.	Variable	Coefficient	Mahalanobis D^2	F Value
1962	4	X1	0.3675	6.843	33.3**
		X2	-0.4089		
		X3	0.005573		
1963	1	X1	0.3756	7.442	114.9**
	2	X1	0.3761	7.678	58.3**
		X2	0.4610		
	3	X1	0.3732	7.544	57.3**
		X3	-0.006813		
	4	X1	0.3710	8.108	40.4**
		X2	0.8143		
		X3	-0.01576		
1964	1	X1	0.6915	16.371	257.3**
	2	X1	0.7038	19.456	149.6**
		X2	-1.3060 ##		
	3	X1	0.7036	17.259	133.4**
		X3	-0.01826		
	4	X1	0.7098	19.769	116.1**
		X2	-1.211		
		X3	-0.01124		
1965	1	X1	0.5986	12.888	238.4**
	2	X1	0.6102	13.682	124.8**
		X2	0.7287		
	3	X1	0.6048	13.170	120.1**
		X3	0.0103		
	4	X1	0.6130	13.79	82.7**
		X2	0.6668		
		X3	0.006431		

** - significant at 1 per cent level.

\# - addition of new variable significantly increases discriminating power at 5 per cent level

- addition of new variable significantly increases discriminating power at 1 per cent level

The individual network discriminant results, appearing in detail in Appendix Table 3, lead to a similar conclusion. A summary of these results appears as Table 4, below.

Table 4

Summary of Linear Discriminant Analysis

of the Retention Decision - Individual Networks

Discriminant Number	Variable Added	Number of Comparisons	Number of Significant Additions to D^2			
			Positive Coefficient		Negative Coefficient	
			@5%	@1%	@5%	@1%
2	X2 to X1	18	2	0	0	2
3	X3 to X1	18	1	0	0	2
4	X2 to X1 and X3	18	1	1	0	0
4	X3 to X1 and X2	18	1	0	1	1

of 72 separate additions of either X2 or X3, only 6 provide a significant increase in the explanatory power of the linear discriminant and possess the positive sign required to support the Commission's hypothesis. Six additional comparisons provide a significant increase in D^2 but with a negative coefficient. Sixty of the seventy-two additions provide no significant increase in explanatory power, providing strong support for the theory that the value of residual rights is capitalized into program purchase prices and that these rights do not affect the retention decision.

In both the pooled and individual-network results, the coefficients of X2 and X3 are more frequently negative than positive. This slight inverse relationship between syndication interests and the probability of retention, particularly for X2 in the early years of the sample, is

somewhat puzzling. A possible explanation might lie in the magnitude of the network's investment in these rights as reflected in the prices per network episode paid to suppliers. The value of the distribution right in a marginal program may not be sufficiently large for the network to view continued investment in the program series as an attractive alternative. In the 1960-63 period, the profits from distribution fees were quite small,[55] and the present value of distributing a mediocre series in syndication markets might have been less than the cost of these rights which was built into the networks' program payments.

The discriminant analysis should be rather conclusive evidence that network ownership of profit shares or distribution rights did not increase the likelihood of annual renewal of a program series. This is not surprising if networks pay for these syndication interests through higher initial program prices. A program of average success on the network and in which the network has syndication interests is not likely to be more attractive than another program of equal success in which the network has no interests because the former's cost per episode shown on the network is likely to be higher than that of the latter. Indeed, the above results show that in some instances ownership of the syndication right may upon occasion increase the chance of a program's rejection. The Commission's theory of supplier exploitation simply cannot be supported from the evidence.

Summary. The analysis contained in this Section leads to the conclusion that the F.C.C.'s Proposed Rule is based upon a number of misconceptions. The Commission's hypotheses which were constructed to explain changes in programming practices in the past decade have led it to incorrect prescriptions for alleviating poor performance in network broadcasting. The next Section is devoted to providing an alternative hypothesis to explain changes in programming practice.

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55. See my "The Supply Price of Programs to Television Networks and the Cost of Residual Rights," loc. cit., for discussion of this point.

V

An Alternative Hypothesis

Whether the F.C.C. errs or not in its prescription for improving competition and variety in program supply, it cannot be doubted that the Proposed Rule will have adverse effects upon the networks.

The networks express a concern that no one else could perform the program-brokerage function, described in Section 1 above. Taken literally, this proposition is probably not correct. In fact, it is technically possible for intermediaries to provide program brokerage, assembling programs for advertisers and placing these programs on the networks, but such a development would undoubtedly create a variety of problems.

Program brokerage could not be provided by a large number of firms. Fifty per cent of the networks' prime-time programs amounts to only 35 hours of entertainment series, and it is unlikely that the economies of scale are so low as to permit a large number of firms to act as brokers for so few hours of programming. As a result, a bilateral oligopoly would develop in which networks might find themselves paying considerably greater fees for brokerage than they now encounter internally. Moreover, the increased difficulty in arranging long-term contracts with brokers, providing the networks with sufficient latitude to proscribe program matter which is deemed not to be in the public interest, to move programs from one time period to another, and to cancel programs which are reducing audiences in subsequent programs, argues against such a prescription.

It seems quite clear that the development of packager-licensed programming derived from the desire of networks to gain the additional flexibility in the choice of programs and the sale of commercial time to advertisers provided by their integration into program brokerage. This would appear to be the key to understanding a phenomenon which the Commission believes to be anticompetitive.

Program brokerage does not provide an accretion to the networks' market power; it merely allows them to benefit more handsomely from this power.

To demonstrate the above hypothesis, we require a model of advertiser demand for commercial television time which embraces different means of purchasing advertising.

Recalling our discussion of Section III above, we may ask if network profits are related to the nature in which the network obtains its programming. Will packager-licensing lead to larger profits than the reliance upon advertiser-supplied programs? The answer would appear to be that the source of programs is an important determinant of network profitability for a number of reasons.

1. Program choice. In general, there are strong reasons for believing that a network with monopoly power will not offer its advertisers the same menu of programs as they would choose if they were supplying programs to the network. A monopolistic network does not necessarily restrict the number of programs offered to advertisers, but if the number of hours in prime time is a binding constraint, it will reduce the number of viewers offered during these hours through its choice of programs. Monopolistic output restriction takes the form of reducing the number of viewer hours, the network's principal output.

For packager-licensed programs, the network monopolist will choose programs in each program hour which satisfy the following condition:

$$(1) \qquad (\partial A/\partial p_p) \cdot (MR) = 1$$

where $\partial A/\partial p_p$ represents the additional audience obtained from the last dollar spent upon the hour of programming, MR is the incremental revenue obtained from the sale of another viewer hour, and p_p equals the program price.[56] This result merely states that the marginal value of the last dollar spent upon

56. It is assumed that for any particular type of programming, a network faces an audience-supply schedule which is a function of its expenditure on program series. It is also assumed that the advertisers demand, and networks supply, a flow of homogeneous viewers -- an assumption which is examined below.

programming must be equal to one dollar. As long as $\partial^2 A/\partial p_p^2$ is less than zero -- indicating diminishing marginal productivity of program expense -- this condition will assure maximum profits for the network. Marginal revenue, MR, is obtained from the demand curve facing the network monopolist -- a demand curve which is simply the horizontal summation of advertisers' marginal-value-product curves for advertising, measured in viewer-hours per week.

The advertiser will always equate his marginal value product of advertising to the price of viewer hours. If he supplies his own program, he will choose p_p such that $(p_p + p_t)/A$ is a minimum, where p_t is the hourly rate charged by the network monopolist for access to its affiliated stations. This simply argues that an advertiser chooses his program in order to minimize his cost per viewer, which requires that:

$$(2) \qquad MVP_A = (p_p + p_t)/(\partial A/\partial p_p)\cdot(p_p + p_t) = 1/(\partial A/\partial p_p)$$

where $\partial A/\partial p_p$ is once again the incremental productivity of another dollar spent on the program in terms of viewer hours,[57] and MVP_A is the advertiser's marginal value product of advertising. Under packager licensing, the advertiser will choose to buy commercial minutes up to the point where:

$$(3) \qquad MVP_A = p_A$$

where p_A is the price per viewer hour connoted by the network's charge for commercial minutes. From (1) and (3) above, we see that for packager licensing:

$$(4) \qquad 1/(\partial A/\partial p_p) = MR < MVP_A$$

since the network has market power. Therefore, a network monopolist will choose less costly programs for sale to advertisers than would the advertisers if they were supplying their own series. Regardless of the time rate chosen by the network,

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57. This result is obtained by differentiating $(p_p + p_t)/A$ partially with respect to p_p and setting the result equal to zero. This results in: $\partial[(p_p+p_t)/A]/\partial p_p = [A-(p_p+p_t)\ (\partial A/\partial p_p)]/A^2 = 0$. But $A^2 \neq 0$ for any program choice; therefore, $A-(p_p+p_t)\ (\partial A/\partial p_p) = 0$ and $A = (p_p+p_t)(\partial A/\partial p_p)$ for an optimum, substituting this value for A in $(p_p+p_t)/A$ yields (2).

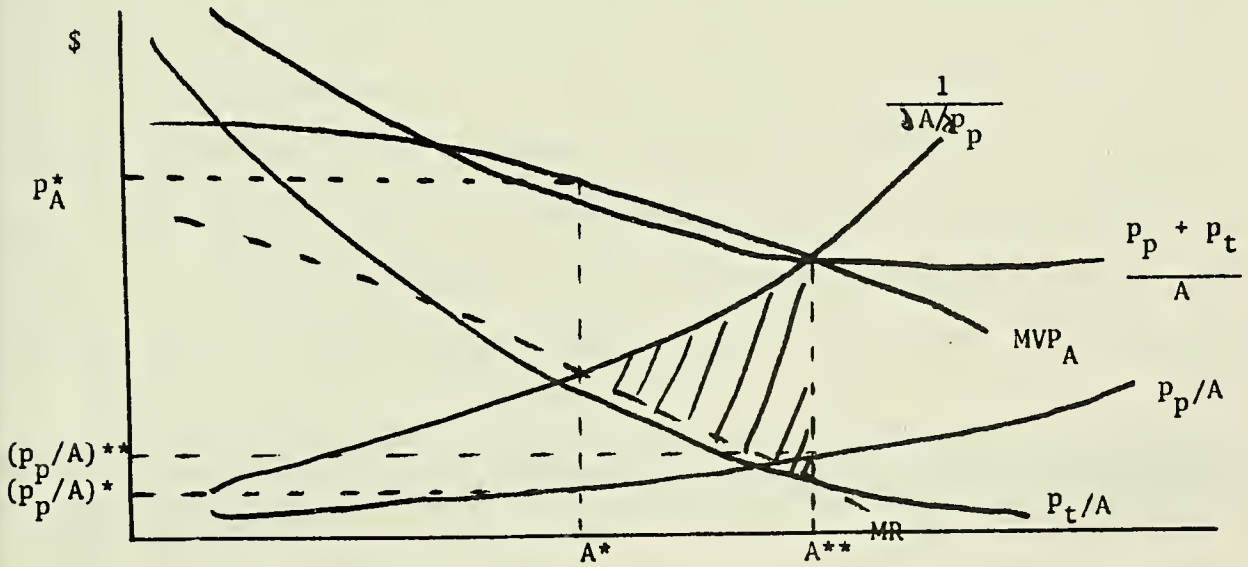
advertisers will choose more costly programs, reacting to changes in the network's time rate by increasing or decreasing the number of programs they choose to bring to the network for exhibition.

It is possible to represent this result graphically by drawing those schedules which affect the programming decision in the incremental hour and the effect of this decision upon intramarginal hours of network broadcasting. In Figure 2 the relevant cost and demand schedules for the incremental hour of network broadcasting are drawn. The ΣMVP_A curve is the aggregate demand schedule for viewer hours in the incremental hour; therefore, the network's marginal revenue function is not the curve marginal to this ΣMVP_A curve, but rather it is the rate of change of total advertising expenditures for all hours during the week.

The network licensing its own programs will set $1/(\partial A/\partial p_p)$ -- the marginal cost of audience -- equal to MR, choosing a program of audience size A* whose cost per viewer is $(p_p/A)^*$. If advertisers license programs they will tend to choose a program for which MVP_A is equal to $1/(\partial A/\partial p_p)$, and the network's optimal time charge, p_t, is found by setting p_t/A^{**} equal to p_A^{**} minus $(p_p/A)^{**}$. If it

Figure 2

The Program Choice for a Given Hour of Network Broadcasting



chooses a higher time charge, the advertisers will find that the total cost of the optimal program of audience A**, read from the curve $(p_p+p_t)/A$, will be greater than its value, and they will choose not to supply the program for this incremental hour. Instead, they will optimize over the first n-1 hours of prime time, increasing their expenditures on programs, p_p, in these hours. They will do so simply because the incremental cost of additional viewer hours will be less in these n-1 hours than in the nth hour, given the network's time charge.

Advertisers supplying their own programs therefore choose different program "quality" than the network would if it were free to license programs directly. The cost per week to the network of this freedom of advertiser program choice can be measured from Figure 2. It is the shaded area between the incremental cost schedule, $1/(\partial p_p/\partial A)$, and the network incremental revenue schedule, MR, multiplied by the number of hours of programming per week. Note that this cost would be zero if the network possessed no market power.

There is an additional factor which will lead a network licensing its own programs to restrict audience size during the incremental hour even further than suggested by the above analysis. The addition to the network's total audience occasioned by programming during this incremental hour is not simply the number of viewers during that hour, but some smaller magnitude depending upon the degree to which viewers restrict their viewing in the n-1 hours of the week due to the nth program hour. This difference depends upon the "shiftability" of viewer preferences, i.e., the degree to which viewers are able or willing to shift the time periods during which they choose to watch particular types of programs.[58] In terms of Figure 2, this simply means that for any program broadcast in the incremental hour, $\partial A/\partial p_p$ is likely to be lower for the network

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58. See Peter Steiner, "Program Patterns and Preferences and the Workability of Competition in Radio Broadcasting," Quarterly Journal of Economics, May 1952, pp. 194-223, for a thorough discussion of the importance of shiftability in program decisions.

than for the advertiser who licenses but one program directly. As a result, $1/(\partial A/\partial p_p)$ for the network will be above and to the left of the corresponding curve for the advertiser supplying his own program.

These results may appear surprising at first, but this is perhaps due to a tendency to view the network's output as program hours when it is in fact viewer hours. Under a system of advertiser-supplied programs, the network cannot affect the incremental cost of viewers to the advertisers; it can only increase the average cost of these audiences. Advertisers will always be free to choose programs efficiently, and this will be against the network's best interests.

Extension of this model to a three-firm oligopoly requires, as always, some assumptions about the reaction function of each network. The nature of the final program-price equilibrium depends crucially upon such assumptions. If networks behave as Cournot oligopolists -- choosing program prices as if their rivals' choices were fixed -- they will undoubtedly reach an equilibrium at which audiences are larger and program prices greater than under simple monopoly, but the equilibrium will find smaller outlays for programs than those chosen by advertisers supplying their own programs. As the number of networks increases, the equilibrium will resemble a competitive one and a similar program structure will emerge under packager licensing or advertiser supplying of programs.[59]

This model leads to a quite different conclusion from that obtained by the Commission in its analysis of programming practices. Networks offer programs which are less expensive and appeal to somewhat smaller audiences than would advertisers supplying their own program series. Of course, this difference may be based upon different implicit models of advertiser behavior. I see advertisers as seeking the greatest exposure per dollar spent; the Commission argues that some

59. A full discussion of this problem is not possible in this paper. See my "Television Network Competition and Program Diversity" (unpublished manuscript) for such a discussion.

advertisers may be seeking to promote an "image" by supplying programs which appeal to a narrow audience at a very high cost per viewer. But the two models may not be exclusive -- advertisers seeking "image" will still seek to minimize their cost per viewer of a given type. A network monopolist, licensing its own programs, can just as easily contract the supply of a select audience to such advertisers as the supply of Joneses to the rest.

2. Augmentation of demand. This is a very simple, but most important argument. Networks have moved to packager licensing and the dispensing of commercial minutes in order to increase the market demand for network advertising. Under a system of advertiser supply, advertisers usually were required to subscribe at least half of the cost of a half-hour series for one season. Alternate sponsorship of a new half-hour series would cost at least $2 million current prices, a total far greater than the advertising budget of many current purchasers of network advertisers. The old system was simply rationing out too many small buyers of network time. Of 439 network advertisers in 1968, 247 spent less than $1 million in the medium during the year.[60] It is the reduction of this minimum investment from, say, $2 million to as little as $30,000 per year which is essential to maximum network profits; therefore, someone must serve as a program broker. It was argued above that it seems unlikely that an independent brokerage market could develop downstream from a concentrated network market or that an independent brokerage market would supply its services as efficiently for networks as a vertically-integrated firm.

In addition, the opportunity afforded advertisers to disperse their commercial announcements among many different prime-time series has probably increased the market demand for viewer hours in another manner. The marginal value product of advertising is likely to decline more rapidly the more an advertiser is constrained to address the same audience. Since television programs are known to

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60. Television Bureau of Advertising, TVB News, February 24, 1969.

have devoted viewers who watch each episode without fail, requiring advertisers to concentrate their purchases in a single, or at most a few programs will probably lower the MVP_A schedule in Figure 2. Through program brokerage, networks are able to offer more dispersed patterns of commercial announcements to their customers and to profit accordingly.

Finally, the ability to dispense commercial minutes one at a time or in large packages provides greater flexibility in pricing if advertisers possess different price elasticities of demand. Those whose demand is relatively price-inelastic may be separated from those with more price-elastic demand. While such discrimination has not been proved by critics of the industry, this opportunity is certainly enhanced by the networks' own performance of program brokerage.[61]

These considerations would seem to be the most important explanations for network opposition to the Commission's Proposed Rule. Requiring that networks foreswear syndication revenues is not likely to reduce network profits appreciably, but requiring that they depend upon individual entities to act as dealers and brokers of programs for network exhibition may be quite costly to the networks without a corresponding gain in economic welfare.

3. Risk bearing. The development of network program brokerage may well be a reflection that networks are better able to spread the risks of investing in costly entertainment series. The discussion in this paper has tended to treat program purchases as if they were effected in a spot market, one episode at a time. In fact program purchasers, whether they are networks or advertisers, must invest in a number of episodes of a program series before the series appears on

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61. Recent evidence presented by David Blank ("Television Advertising: The Great Discount Illusion, or Tonypandy Revisited," Journal of Business, January 1968, pp. 10-38) and John L. Peterman ("The Clorox Case and Television Rate Structures," Journal of Law and Economics, October 1968, pp. 321-422) lends support to the notion that networks do not discriminate in favor of large advertisers, but this is not conclusive proof of the absence of price discrimination. It may be that price-elasticity of advertiser demand is not related to advertiser size.

network television. Commitments of 13, 26, or 39 weeks are not uncommon, and buyers must pay penalty fees for cancellations short of such commitments.

Since the success of a program in its initial network exhibition and in future syndication is a function of its position in the network schedule, an advertiser supplying but one program may face a greater variance in the returns to his investment than a network which may pool this risk over a number of series. Moreover, the network has greater latitude in shifting programs among time periods in order to achieve the best results for its array of programs when it licenses these programs directly. Whether these considerations lead to a significant reduction in the risk of supplying programs cannot be determined in this paper, but this possibility does exist. Any reduction in the risk associated with program procurement obviously lowers to supply price of programs and increases network net revenues for a given array of program choices.

In summary, it is suggested that the networks have turned to direct licensing of their own programs in order to increase the net demand for prime time. While there are reasons to believe that this backward integration has led to a change in program patterns, this change has not had the adverse effects upon program diversity or quality which the F.C.C. believes.

VI.
Conclusions

This analysis of network program procurement practices has been rather general in nature, requiring the separate presentation of a number of issues raised by recent changes in network practices. In part, this generality is occasioned by the necessity of describing a market structure which is little understood by economists, but much of the discussion has been required in order to address the far-ranging criticisms raised by the F.C.C. Unfortunately, the Proposed Rule -- outlinedin Section II -- is thought by some to be a palliative

for countless evils of network broadcasting. The conclusions reached in this paper are that such a rule -- requiring networks to limit direct licensing of program series and to foreswear domestic syndication interests in programs -- will have little beneficial effect upon the parameters which the Commission deems important: network program diversity, competition among program suppliers, and competition in syndication.

The most likely effect of the Rule will be to lower network profits by allowing advertisers to choose more expensive programs and by making more cumbersome the performance of program brokerage. The effect of such changes upon economic welfare would be difficult to assess, but it is a safe prediction that network program schedules will continue to exhibit little diversity until networks are more numerous. In this respect, the Commission's recent decision to encourage cable antenna television companies to originate their own programming may be the single most important step along the road to greater competition in network broadcasting and increasing diversity in programming.

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Appendix Table 1

Retention Decision
Analysis of Variance

Year	Mean X1 Retained Series	Mean X1 Dropped Series	Difference	F-Value	Mean X3 Retained Series	Mean X3 Dropped Series	Difference	F-Value
				Network #1				
1960	20.14	15.74	4.40	6.70*	27.15	28.33	-1.18	0.00
1961	19.43	14.77	4.66	9.04**	28.40	29.81	-1.41	1.00
1962	19.49	12.99	6.50	18.06**	36.75	25.12	11.63	2.67
1963	20.19	13.37	6.82	23.95**	26.40	26.19	0.21	0.00
1964	20.65	16.27	4.38	10.18**	30.02	27.92	2.10	0.50
1965	19.69	15.70	3.99	17.86**	31.39	26.03	5.36	0.33
				Network #2				
1960	22.46	16.14	6.32	12.15**	16.81	27.00	-10.19	2.00
1961	22.59	15.97	6.62	30.28**	7.95	27.11	-19.16	7.00**
1962	23.46	17.67	5.79	2.90	12.78	18.33	-5.55	0.33
1963	25.10	17.09	8.01	12.48**	13.23	15.42	-2.19	0.00
1964	22.45	15.04	7.41	79.86**	13.12	20.48	-7.36	1.00
1965	22.62	16.37	6.25	14.56**	21.89	13.75	8.14	1.67
				Network #3				
1960	22.45	14.12	8.33	22.69**	22.08	25.92	-3.84	0.20
1961	22.26	15.87	6.39	41.81**	16.00	24.08	-8.08	0.17
1962	19.58	15.27	4.31	7.74**	20.89	26.84	-5.95	0.00
1963	20.87	14.75	6.12	12.58**	19.83	31.50	-11.67	0.40
1964	20.64	15.21	5.43	18.07**	20.08	20.64	-0.56	0.00
1965	20.87	13.29	7.58	56.39**	24.81	35.31	-11.00	3.67

* significant at 5 per cent level
** significant at 1 per cent level

Appendix Table 2

Retention Decision

Syndication Rights--Chi Square Test

Year	Proportion of Retained Series in which Network Owned Syndication Rights	Proportion of Dropped Series in which Network Owned Syndication Rights	Difference
		Network #1	
1960	0.00	0.333	-0.333*
1961	0.833	0.667	0.166
1962	0.300	0.154	0.146
1963	0.250	0.143	0.107
1964	0.250	0.300	-0.050
1965	0.222	0.167	0.055
		Network #2	
1960	0.250	0.600	-0.350
1961	0.167	0.500	-0.333
1962	0.263	0.333	-0.070
1963	0.375	0.125	0.250
1964	0.308	0.636	-0.328
1965	0.467	0.300	0.167
		Network #3	
1960	0.300	0.417	-0.117
1961	0.444	0.300	0.144
1962	0.333	0.333	-0.000
1963	0.333	0.364	-0.031
1964	0.125	0.444	-0.319
1965	0.231	0.444	-0.213

* difference significant at 5 per cent level

Retention Decision
Discriminant Analysis

Variable		1960	1961	1962	1963	1964	1965
Network #1							
X1		0.2827	0.3073	0.5385	0.7900	0.4668	0.6719
	D^2	1.545**	2.051**	12.243**	28.998**	4.182**	7.183**
X1		0.4701	0.3158	0.5340	0.7956	0.5189	0.6909
X2		-6.910##	-0.6614	0.2747	1.122	-1.405	0.9279
	D^2	19.097**	2.134**	12.309**	31.300**	5.489**	7.881**
X1		0.2830	0.3098	0.5470	0.7905	0.4677	0.6656
X3		-0.002937	0.004310	0.03975#	0.003040	0.02432	0.009755
	D^2	1.557*	2.066**	16.131**	29.041**	4.409**	7.340**
X1		0.4703	0.3209	0.5493	0.8036	0.5487	0.6846
X2		-6.909	-0.7544	-0.1374	1.239	-1.533	0.9337
X3		-0.002358	0.006668	0.04044#	-0.006517	-0.01726	0.0100
	D^2	19.125**	2.171*	16.154**	31.460**	5.984**	8.056**
Network #2							
X1		0.6165	0.9168	0.2152	0.3187	0.9483	0.4217
	D^2	15.173**	36.853**	1.553	6.521**	49.252**	6.946**
X1		0.5962	1.161	0.2342	0.3084	0.9562	0.4476
X2		-0.4985	-4.287##	-1.163	0.7031	-1.718	1.286#
	D^2	15.535**	83.171	2.226	7.004**	58.388**	9.071**
X1		0.6084	1.137	0.2140	0.3244	1.090	0.4239
X3		-0.006127	-0.1236##	-0.0150	-0.08012	-0.07036##	0.02242
	D^2	15.261**	97.984	1.749	7.701**	73.702**	8.020**
X1		0.5960	1.2371	0.2250	0.2988	1.082	0.4447
X2		-0.4918	-2.700	-1.584	3.217#	-0.3428	1.104
X3		-0.000357	-0.09315	0.01286	-0.07758#	-0.06543	0.008218
	D^2	15.535**	118.294**	2.300	11.346**	73.996**	9.183**
Network #3							
X1		0.5475	1.543	0.4480	0.6008	0.8866	1.544
	D^2	20.816**	97.078**	3.730**	13.485**	23.146**	136.984**
X1		0.5466	1.576	0.4496	0.7358	0.8719	1.539
X2		-0.07231	-0.724	0.1723	2.040#	-0.2943	-0.2543
	D^2	20.825**	99.621**	3.756**	19.674**	23.284**	137.32**
X1		0.5521	1.541	0.4472	0.6202	0.8897	1.533
X3		-0.01376	-0.01804	-0.01443	-0.03518	0.006688	-0.2674
	D^2	21.655**	99.718**	4.055**	17.650**	23.272**	141.962**
X1		0.5515	1.566	0.4517	0.8949	0.8663	1.534
X2		-0.04378	-0.5402	0.5459	3.820##	-0.5197	0.03387
X3		-0.01372	-0.01473	-0.02012	-0.7439##	0.009949	-0.02698
	D^2	21.655**	100.816**	4.273**	38.713**	23.741**	142.053**

* discriminant significant at 5 per cent level
** discriminant significant at 1 per cent level
\# additional variable increases discriminating power at 5 per cent level
additional variable increases discriminating power at 1 per cent level